Name:

at1124exam: Radicals and Squares (v813)

Question 1

Simplify the radical expressions.

$\sqrt{27}$ $\sqrt{45}$ $\sqrt{20}$

$\sqrt{3 \cdot 3 \cdot 3}$ $\sqrt{3 \cdot 3 \cdot 5}$ $\sqrt{2 \cdot 2 \cdot 5}$

$3\sqrt{3}$ $3\sqrt{5}$ $2\sqrt{5}$

Question 2

Find all solutions to the equation below:

$$\frac{(x-8)^2+3}{7} = 12$$

First, multiply both sides by 7.

$$(x-8)^2+3 = 84$$

Then, subtract 3 from both sides.

$$(x-8)^2 = 81$$

Undo the squaring. Remember the plus-minus symbol.

$$x-8 = \pm 9$$

Add 8 to both sides.

$$x = 8 \pm 9$$

So the two solutions are $x = 17$ and $x = -1$.

Question 3

By completing the square, find both solutions to the given equation. *You must show work for full credit!*

$$x^2 - 6x = 91$$

$$x^2 - 6x + 9 = 91 + 9$$
$$x^2 - 6x + 9 = 100$$
$$(x-3)^2 = 100$$
$$x - 3 = \pm 10$$
$$x = 3 \pm 10$$
$$x = 13 \quad \text{or} \quad x = -7$$

Question 4

A quadratic polynomial function is shown below in standard form.

$$y = 2x^2 + 20x + 43$$

Express the function in **vertex form** and identify the **location** of the vertex.

From the first two terms, factor out 2 .

$$y = 2(x^2 + 10x) + 43$$

We want a perfect square. Halve 10 and square the result to get 25 . Add and subtract that value inside the parentheses.

$$y = 2(x^2 + 10x + 25 - 25) + 43$$

Factor the perfect-square trinomial.

$$y = 2((x+5)^2 - 25) + 43$$

Distribute the 2.

$$y = 2(x+5)^2 - 50 + 43$$

Combine the constants to get **vertex form**:

$$y = 2(x+5)^2 - 7$$

The vertex is at point $(-5, -7)$.